Example:

A certain county is concerned about a possible infestation in it's pastureland. They take a random sample of 75 locations in the county and find that 13 of them are infested. Create a 95% confidence interval for the true percent of infested locations in the county.

(0.08766, 0.259)

(A)

Conditions

① Random : stated as a random sample (SRS) ✓

② Success/Failure : at least 10 success/failure ✗ -1

③ 10% Condition : 75 is less than all possible locations. ✗ -1

All conditions have been met. ___ ___ -1.5

CI : $p \pm z^* \sqrt{\frac{pq}{n}}$ -2

(0.088 ; 0.259) ✓

95% of sample proportions lie between 8.8% and 25.9%

$\hat{p}$ ✗ -2

(B)

Conditions

① 10% Condition: 75 locations is less than all possible locations in the county's pasture land. X -1/2

② Randomization: Stated as a random sample

③ Success/Failure: $n\hat{p} = 13 \geq 10$ $n\hat{q} = 62 \geq 10$ At least 10 successes/failures.

All conditions have been met to use the Normal model for a 1 prop z-interval.

$\hat{p} = \frac{13}{75}$ $n = 75$ $z^* = 1.96$

CI: $\frac{13}{75} \pm 1.96\sqrt{\frac{(\frac{13}{75})(\frac{62}{75})}{75}}$

$(0.08766, 0.259)$

I am 95% confident that the actual proportion of all possible locations that are infested lies between 8.8% and 25.9%.

(C)

$\hat{p} \pm z^* \sqrt{\frac{\hat{p}\hat{q}}{n}}$ -2

(0.08766, 0.259)

-2

① 10% condition : 13 locations is less than 10% -1

② Random : Representative sample.

③ Succes/Fail : $n\hat{p} = 13 \geq 10$ $n\hat{q} = 62 \geq 10$ -½

statement -2

95% of samples are between 8.8% and 25.9% -2

(D)

10% Condition ✓
Random ✓
~~Success~~ Large Enough ✓ -3

statement -2

CI: ~~$.173 \pm 1.645\sqrt{\frac{(.173)(.827)}{75}}$~~ -2

~~$(.101, .245)$~~ -1

The proportion of infected locations is between 10.1% and 24.5%. -1